

**More Than Just Green Space: Urban Parks and Holistic Well-being for  
Reconnecting People to Nature**

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**LWS 548 Major project**

## Contents

1. Acknowledgement .....	3
2. Executive Summary .....	3
<b>Overview</b> .....	3
Objective.....	4
Method .....	4
Result .....	4
Conclusion .....	5
3. Introduction.....	6
4. Methods .....	8
5. Literature Review .....	9
5.1. Environmental Issue Mitigation .....	9
5.2. Humans and Nature .....	12
5.3. Educational .....	15
Economic Values.....	15
5.4. Holistic health.....	16
5.5. Mental Health.....	18
6. Synthesis.....	21
6.1 Disconnection from nature .....	21
6.2. Human-nature reconnection.....	22
6.3. Economy .....	24
6.4. Environmental issues mitigation .....	26
6.5. Holistic health.....	32
6.6. Mental Health.....	37
7. Therapeutic landscape case in Stanley Park design .....	38
8. Conclusion/Summary .....	39
9. Recommendation .....	40
10. Reference .....	41

## 1. Acknowledgement

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## 2. Executive Summary

### Overview

With the significant increase in population, the urban sector occupies more and more natural areas for human land use. As the boundary between urban and nature becomes distinct and further away from the city's center, urban residents tend to be disconnected from nature. By looking through this anthropocentric lens, it can be seen how important the preservation of urban green spaces is to the residents. The Urban Park, one of the most common blue-green facilities, plays a vital role in the urban ecosystem. However, its functions and services are not fully appreciated by the public that is disconnected from nature.

This project provided an integrated view of an urban park on its benefits from different perspectives, to inspire people to reconnect with nature by 'forest bathing' in urban parks and acknowledge the indispensable role of urban parks.

## Objective

This project (1) identified the causes of disconnection between humanity and nature, (2) evaluated the benefits of urban parks from the various aspect, and (3) discussed the pivotal role of urban parks in reconnecting humanity to nature and bringing greater well-being.

## Methods

A comprehensive literature review was conducted on the role and impact of the urban park based on its environmental, social, and economic benefits. Evidence of urban park reconnecting humanity and nature were evaluated. Personal communication and consultants with field experts have been incorporated to deliver accurate information.

## Result

The disconnection between humanity and nature is primarily due to the modernized urban lifestyle, which led to materialism, affects experience qualities, results in a cognitive difference, alters social norms, and changes the environment. Urban Parks are essential to reconnect nature and people because it offers proximity access for “nature play”, significantly impacts the cognitive connection in adulthood. Moreover, children playing in urban parks enhance their learning experience, nourish emotions, and increase their well-being. By reconnecting humanity to nature, the urban park provides economic benefits by hosting events, attracting tourists, and stimulating the local economy. The presence of an urban park plays a crucial role in delivering greater well-being to the local communities by mitigating environmental issues, reducing pollution, increasing individual immune systems, and improving mental health conditions.

## Conclusions

The issue of humanity-nature disconnection has become increasingly important from both external and internal aspects. The urban park is one of the most accessible and approachable solutions to the problem. In addition to providing important urban green space and tremendous environmental, social, and economic benefits, urban parks also bring greater holistic well-being by enhancing physiological and psychological health.

### 3. Introduction

The rapid population growth worldwide has made cities the most crucial non-natural ecosystem for social well-beings. Meanwhile, the unprecedented large population associated with higher population density requires more urban areas to a healthy live. Today, around 55% of the global population lives in urban areas, and the proportion is expected to increase to 68% in the next 30 years (Statistic time, 2021). In Canada, there are more than 80% of the population have lived in an urban area since 2010 (Figure 1). In the context of sustainable development and pursuing aesthetic quality, green space is often one of the indispensable elements in city design.

Urban parks are typical green spaces that offer recreation to residents and provide essential features to the urban environment (Cicea & Pirlogea, 2022) Urban parks can provide ecosystem services that mitigate climate effects, create social cohesion that connects people, brings economic benefits with recreation, and improves the quality of life with better health.(WHO, 2016) Based on the location, function, access, ownership, amenities, visuals, length of stay, services, and area, urban parks are classified into four types: pocket parks, common green, civic plazas, and urban recreational parks (Fairfax County, Virginia, n.d.).

Pocket parks are public parks that occupy up to one acre of land with no uniform characteristics or shapes due to their small sizes. A pocket park can only provide limited open space for interactions and recreation (Trust for Public Land, 2022).

Common green-parks have an open lawn area for recreation and social purposes. Moreover, the park usually contains facilities such as off-leash dog areas and community

garden plots. The purpose of the lawn determines the complementary facilities, such as picnicking ground and sports (Fairfax County Virginia, n.d.).

A civic plaza is usually located at an important intersection of streets or buildings, which contains a public gathering space for commercial and social activities (Fairfax County Virginia, n.d.). The visuals are mainly hardscape elements with reasonable tree coverage. The recreation amenities in this type of urban park are supplementary facilities (Fairfax County Virginia, n.d.).

The urban recreational park addresses the recreation needs of high population density areas. The primary purpose of this type of urban park is to provide amenities and facilities for the residents and visitors. The typical facilities included are an open playground, athletic field, and skate park (Fairfax County Virginia, n.d.).

As more urban area is required due to the increase of the population, more and more natural areas are converted into human land use and brought into the urban sector, which leads to a distinct and crisp boundary between nature and the human environment. The modernized urban lifestyle makes people become unfamiliar with nature and thus disconnected from nature. People isolated from the natural environment might create cognitive differences that underestimate the ecosystem benefits and overweight the economy. Moreover, with increasing population and urbanization, people are getting less attached to biodiversity and nature, which can cause holistic health and mental health issues. (Ives et.al, 2018) Therefore, an urban park as a typical green space in the city is one of the few places to get in touch with nature. Moreover, in addition to its environmental, social, and economic benefits, the urban park also plays a vital role in

human health. However, some people and the public usually underestimate, or do not fully acknowledge, the human-nature side of urban parks.

Thus, this project aim was to (1) identify the causes of disconnection between humanity and nature, (2) to evaluate the benefits of urban parks from various aspects, and (3) to discuss the role of urban parks in reconnecting humanity to nature to provide greater well-being. The project focused only on the large urban park (common green, urban forest park, and urban recreational park), and the goal was to inspire people to go outside 'forest bathing' in urban parks and acknowledge various values of urban parks.

#### 4. Methods

For this project, a systematic review of the literature was conducted on the roles of urban parks in the urban context. The effect of urban parks on the environment, social, economic, and human health were examined to frame a comprehensive analysis of its importance with increasing urbanization. Case studies were included into the literature synthesis as additional sources to support the arguments. Studies related to people enjoying and having fun in urban parks were also considered valuable sources to document that people can reconnect to nature via outdoor activities and provide information to inform people they should go out more frequently to the open public spaces if they are depressed or restricted locally. Thus, studies related to the visits to urban parks were collected as a complementary source to help assess the impact of urban parks on health. The project also involved a personal communication approach, consulting with relevant experts to verify accurate information.



## 5. Literature Review

### 5.1. Environmental Issue Mitigation

Yao, et al, (2022) conducted a study on how urban parks can mitigate the urban heat island effect. The study's objectives quantified the cooling effects of urban parks from maximum-impact and accumulation-impact perspectives, identifying the key factor affecting the cooling effect, and providing recommendations for urban park design and planning. The study area was Fuzhou, which has been characterized as one of the hottest Cities in China since the 21st century. There were 31 urban parks identified as study sites, excluding the coastal parks because water bodies pose additional benefits in reducing the heat island effect. A mathematical approach was applied to the data collected from the 31 parks to evaluate the land surface temperature and quantify the cooling effect. Several indices were calculated to assess the weight of influence by each factor. Finally, statistical analysis was conducted to ensure a realistic confidence level. The results showed that the hot and cold regions are highly related to impervious areas and areas with high vegetation or water coverage. The cold spots had a significant confidence level of overlapping with an urban park area, implying that urban parks are important to reduce urban heated islands. The temperature in the park was 1.4 °C lower on average than in the City. Moreover, the cooling effect varies in the park and is determined by its intrinsic factors (such as park area and waterbody portion) and extrinsic factors (surrounding and nearby building density). The park area and perimeter were significantly and positively correlated to the park cooling intensity, gradient, and area but negatively correlated to the cooling efficiency. Therefore, following a complex calculation of the threshold value of efficiency, a park area of 1.08 ha was found to have

the highest efficiency and was recommended as the optimal park size. This study provided an excellent insight on the cooling effect of urban parks.

The authors explained and demonstrated-how urban parks can mitigate the urban heated island quantitatively, especially under the context of urbanization. Urban heated island effect is the difference of surfaces with higher albedo resulted in hotter environmental conditions in urban areas. UHI can change the hydrological regime of the city and directly or indirectly affect the local biodiversity, accelerates energy and water use, and increase air pollution, posing extra stress on the resilience of the urban system. Moreover, the effect can affect residents' quality of life, especially during an extreme heat event, which is a growing issue in the future under climate change. This paper not only provided the extent of the cooling effect an urban park can have on average ,but also provided the optimal size of an urban park based on the relationship between cooling area, intensity, gradient, and efficiency.

Nowak, et al, (2014) evaluated the impact of trees and forests within the urban area on air quality and human health. The study area included urban and rural areas of the conterminous United States, and the objective was to approximately measure air pollution (O<sub>3</sub>, NO<sub>2</sub>, PM<sub>2.5</sub>) removed by trees and forests within the city. For methodology, four types of analysis were applied to assess the total tree cover and leaf area, pollutants' hourly flux to and from the leaves, the effect of pollution removal, and the health impact indicated by pollutant concentration changes based on Environmental Benefits Mapping and Analysis Program (BenMap) model. The paper indicated that the pollutant removal by trees and forests within the cities in 2010 was 17.4million tons, which is equivalent to \$6.8 billion in human health value. The pollutants removal monetary value in urban areas

was significantly greater than that in rural areas. The amount of O<sub>3</sub> and NO<sub>2</sub> pollution removals were the most significant and the greatest monetary value of removal were PM<sub>2.5</sub> and O<sub>3</sub>. Moreover, the monetary value of reduced adverse health effects was positively correlated with population density. The study also found a city with high population density such as New York City, had the highest dollar values per ton removed (NO<sub>2</sub>= \$7200 t<sup>-1</sup>; O<sub>3</sub>= \$63,800 t<sup>-1</sup>; PM<sub>2.5</sub> = \$3,852,400 t<sup>-1</sup>; SO<sub>2</sub> = \$2600 t<sup>-1</sup>).

This study linked pollution and human health from an intuitive view in monetary value. The quantification of the environmental benefits of trees and forest are useful in helping people understand the environmental services of green space in-an economic context. The paper also pointed out that population density is associated with the monetary value of pollution, implying that human health is important and the plantation of green landscapes is essential to ensure human well-being. This paper provided constructive information on presenting the environmental value of trees in an understandable public format and delivering the important message of having green spaces such as urban parks in urban areas with high population density.

Zhang, et al, (2012) conducted a study on valuing the economic benefits of an urban park on its rainwater-runoff reduction function. They presented the ecosystem services of the urban green space in monetary terms that the public can intuitively understand, showing the cost of rainwater runoff management only by human-made facilities. For methodology, the study chose Beijing as the study site and applied its inventory data of urban green spaces in the rainwater-runoff-coefficient method as well as the economic valuation methods to evaluate the economic benefits of rainwater-runoff reduction. The paper concluded that green space near-impervious areas, such as the

roadside has the highest runoff coefficient, and the residential green space had the lowest. Moreover, about 154 million cubic meters of rainwater runoff was reduced by Beijing's urban green spaces over its 61,695 ha of total green space area, which is equivalent to 2494 cubic meters runoff reduction for every hectare. Based on the local cost for artificially reducing storm runoff in 2009, the ecosystem services of urban parks could save up to 1.34 billion RMB (1 RMB = 6.83 U. S \$) and the value per hectare of green space was 21,770 RMB, which was equivalent to three-quarters of the maintenance cost of Beijing's green space at that time.

This study showed the monetary terms of ecosystem service for the urban green space, which is useful for showing the economic value of urban parks in general because the public can easily understand the information. Although the study site was in Beijing and the urban environment condition varies in places, the results, in general, are helpful and sufficient to show nature and its ecosystem services are cost-effective.

## 5.2. Humans and Nature

Ives et al. (2018) conducted a study on human-nature reconnection. The objective of their study was to synthesize the current knowledge for the causes of disconnection, consequences of disconnection, and reconnecting as a form of treatment for addressing the mental well-being of people. The paper outlined the feasible approaches to enhance the connections. They proposed a conceptual platform for the public to understand human-nature connectedness, including material connections, experiential connections, cognitive connections, knowledge, emotional attachments, and philosophical perspectives of the relationship between human and nature. The result showed that the causes of disconnection from nature are everywhere. From philosophical perspectives, people are

numbed and overwhelmed by the dominance of materialism and over-consumption. As the result of the historical separation of people from nature, a cognitive disconnection has developed that is caused and reinforced by daily activities. From an experiential perspective, urbanization is characterized as the immediate cause of nature's disconnection. The study pointed out that to connect to nature helps learning and development benefits in children to gain happiness and general well-being, holistic health, and mental health. Reconnecting humans to nature help solve social and environmental problems in the context of myriad challenges facing today's society. Moreover, the paper suggested that reconnection humanity to nature is helping to decouple economic growth from environmental impact. The cognitive disconnection making people underestimate nature's value leads to activities that damage nature, which in turn affect the eco-economy. The solution proposed is to reconnect people's local ecosystem with monetary valuation to make any impact on the environment be recognized more easily.

This study also introduced five types of connections to nature, which provide a comprehensive framework to communicate how urban parks provide connection. The paper defined the advantages of nature-human connection, which is the key concept and cornerstone of the project. The paper synthesized the current knowledge related to the human-nature disconnection and listed out the causes and consequences of disconnecting from nature. The paper also briefly discussed the values and benefits of reconnecting to nature from an educational, health, and social development perspective.

In another study, Johnson and Hurley, (2002) conducted a study that proposed an idea of a “new ecology “of urban parks that can reconnect people to nature, especially for

youth. The study evaluated the spatial changes over time that impoverish children's outdoor play opportunities and identified the negative associated effects. The authors claimed that people are disconnected from nature as urbanization , consumer agricultural and habitat areas, are reducing the accessibility for children to explore nature. The study pointed out that a new urban park model can reverse the disconnection by ensuring accessibility and experiential qualities. The new model of urban park should include a discrete lawn, in which nature provided a scenic backdrop for recreation allowing more integrative models to emerge helping to reconnect children with nature and community. The urban park also should be situated at places that intersects with children's daily life and the quality of experience should closely related to the learning and development concept of sustainability for children. The quality of experience consists of spatial qualities, experiential qualities, and temporal qualities. The spatial qualities are determined by the physical elements of the park, which are scale, legibility, complexity, prospect, and refuge. The activities provided by the environment determine the experiential qualities. Temporal qualities were determined by the changes in physical and social elements that occur in the environment over time.

This study reported an innovative approach to reconnecting people to nature by using urban parks. The proposed conceptual model offers the recommendation and guidelines for future city design. The model's components can also be used as the criteria to evaluate whether an existing urban park can reconnect people to nature. The paper provided a rationale and reason for how each factor affects the reconnection, which is identical to the results of other relevant studies.

### 5.3. Education

Beery (2020) conducted a study exploring how the access to nature is facilitated by urban parks. The study applied a mixed-methods case study to evaluate urban parks as the proximate access for nature play and to identify the barriers and limitations of using nature play in urban parks. The methods used in the study were spatial analysis, survey outreach, and focus group methodology. The result showed that urban parks can mimic nature and is the proximate access to nature play, which plays an important role in young children's urban sustainability and resilience development. Nature play in city parks provided a supportive environment for childhood happiness to be intertwined with challenges, which nourish emotions and increase the well-being of children. The paper concluded that urban parks could serve as nature play sites, and it is crucial to support nature experience opportunities for young children in the city.

This study defined resilience, sustainability, and nature play, which are important concepts to further understand human-nature disconnection. Nature play is any activity that gets children active or thinking actively outdoors, with the end goal of building skills and ability to play without the need for parental or adult control. The paper introduced the benefits of nature play for young children and tested the feasibility of urban parks to mimic such functions. The paper provided the constructive information on how urban parks reconnect people to nature. In addition, the paper also discussed the various benefits, including the educational benefits of nature play in the urban parks, which education is another important topic frequently and widely discussed nowadays.

### Economic Values

The American Planning Association (2003) issued a document that thoroughly discussed how urban parks accelerate economic development. The document pointed out that the property value near urban park usually higher than other places. As the property value increases, the municipal revenues increased as well, because property tax is one of the most important revenue streams for most cities. Moreover, the elder group forming an affluent retirees' group with financial benefits because retirees tend to travel, and bring expendable income into their communities, and use fewer services than they pay for through taxes. Properties near urban parks are usually one of the most popular places to meet their needs. Besides attracting elder groups, urban parks are also attractive to knowledgeable workers and talent.

This study reported many cases and examples of how cities promote economic development by using urban parks. The document is concise and covers a wide breadth of information, which is constructive for explaining the economic benefits of urban parks aside from their economic value in ecological terms.

#### 5.4. Holistic health

Li (2010) evaluated the effect of forest bathing on human health. Forest bathing is the Japanese practice of *shinrin yoku*, , and considered to be good for both physical and mental wellbeing. It has been shown to reduce stress hormone production, improve feelings of happiness and free up creativity, as well as lower heart rate and blood pressure, boost the immune system and accelerate recovery from illness. Li (2019) assessed and investigated the changes in anticancer proteins (natural killer (NK) activity, the numbers of natural killer, cells, granulysin-, perforin-, and granzymes A/B-expressing



lymphocytes) before and after a 3-day/2-night trip to forest areas., and analyzed the blood and urine sampled on days 7 and 30 after the trips for all participants. He found that essential oil (phytoncides) from trees significantly increased the human NK activities, which are at least partially mediated by the induction of intracellular perforin, GrA, and GRN. There were significant differences in NK activity and in the numbers of NK cells before and after the forest bathing trips, which indicated that forest bathing trips significantly increased NK activity (Fig. 1a) and the numbers of NK cells. Because NK cells function to kill tumors ,or virus-infected cells, by releasing perforin, granzymes, and GRN through the granule exocytosis channel, bathing in the forest can improve immune system function. Moreover, the increases in NK activity and number of NK cells with the higher GRN-, perforin-, and GrA/B-expressing cells percentage lasted for more than one week. The significantly increased NK activity and the higher number of NK cells can last up to one month. Another key finding was that phytoncides are absent in the city`s air, implying that visiting a city is not as helpful as bathing in the forest to improve health.

Li, op cit, concluded that forests and trees do, in fact, improve our health. It explained why rehabilitation institutions such as recovery centers and hospitals require a certain proportion of green coverage. The key findings are essential and useful to support that visiting those parks regularly can improve human holistic health.

James, et al, (2015) conducted a review on the health benefits of connecting with greenness. They explored the links between exposure to nature, especially for green vegetation, and health outcomes from recent public health studies. The results showed that the frequency of physical activities is positively related to the accessibility and availability of greenness. Although weight status was interdependent with the

individual's behavior to some degree, greater neighborhood greenness leads to lower obesity in general. Moreover, people who live in a long-distance to access greenspace for physical activity had a higher likelihood of obesity than those who live closer. Regarding birth and developmental outcomes, greenness exposure increases frequencies of physical activity, reducing maternal stress, enhancing social contacts, reducing noise and air pollution, and moderating ambient temperatures. The paper proposed that there was a positive correlation between greenness and birth weight, a common suggestion reported by a majority of relevant studies. Regarding the cardiovascular effect, the paper results suggest that areas with lower greenness led to higher levels of stroke and cardiovascular disease mortality. Moreover, considering temperature, air pollution, noise, and urbanization, children had a lower systolic and diastolic blood pressure if their communities had higher residential greenness.

This study found the possible pathways through which greenness may affect health. The study provided a synthetic graph showing the links between nature and health that are intuitive and concise. The findings covered a wide range of benefits and provided important and useful information to support the argument. This paper demonstrated that people who visit urban visits greenspace, such as urban parks, can increase their well-being.

### 5.5. Mental Health

Sturm and Cohen (2014) studied the relationship between distance to an urban park and associated mental health effects. They aimed to assess psychological distress, in relation to the proximity to urban parks. They applied a cross-sectional analysis of

individual health survey responses. The survey was conducted in a residential area. Samples were collected based on the distance from the park within 400m, 800m, 1.6km, and 3.2km; (N=1070). The results found that individuals living within 400m visited the closest study parks 4-5 times more than those who lived 1.6 km away. The mental health index score (MHI-5) was higher among those who lived within 400m distance from the park and dropped significantly beyond these distances. The paper reported that presence of urban parks helped to increase the local employment rate by 2%.

This study evaluated the relationship and the effectiveness of distance from the urban park and mental health, showing the benefits of visiting urban parks. The regression analysis used the collected data to estimate the relationship, making the result convincing.

Liu, et al, (2017) conducted a study to analyze the relationship among urban parks, residents' physical activities, and mental health benefits. They used a questionnaire survey to investigate respondents' physical activity status, followed by an analysis of the impact on mental health from these activities. The study site was in Beijing, and the form of the survey was the International Physical Activity Questionnaire (IPAQ). Statistical analysis was conducted at the end to ensure the accuracy and confidence level of the results. The results showed that park users had 34.3 minutes more moderate to vigorous physical activity and the frequency of physical activities were significantly more in all forms than non-users. On average, people who visited urban parks worked out for 27.4 minutes, which accounted for 28.9% of their total daily physical activity. Regarding the mental status following park visits, most people reported the most significant improvements was in self-confidence (69.9), followed by energy levels (61.4), self-

perceived health (60.0), mood restoration (52.0) and relaxation (37.8). Physical activity was positively correlated with energy level and mood. Physical activity in public open spaces ,such as urban parks, brought more enjoyment than sedentary activities, and natural interaction improved relaxation and revitalization.

This study showed that urban park increased the nature-human interaction and improved the mental health status of park user. Although the lifestyle of individuals and the surrounding environment varies; visiting urban parks, in general, contributes significantly to improving mental health than other activities. The paper pointed out that park accessibility is correlated with physical activities, with the same results obtained from other studies.

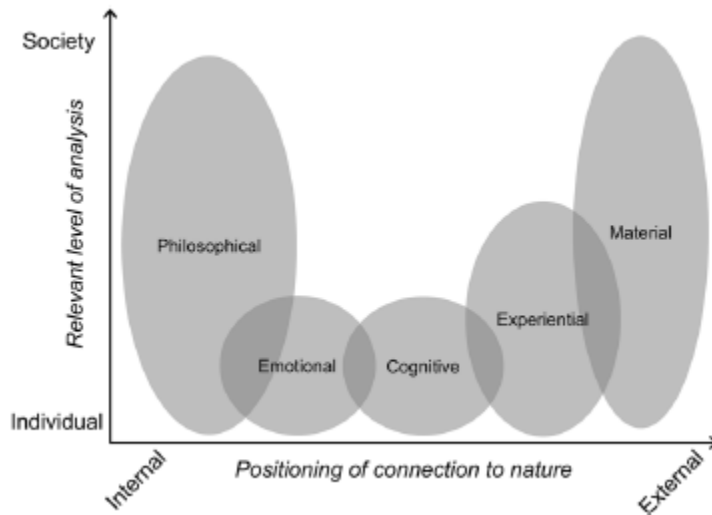
## 6. Synthesis

### 6.1 Disconnection from nature

The term ‘nature’ usually refers to the natural environment, which is vague in defining its boundary (Beery, 2020). From a broad and inclusive aspect, nature is defined as ‘an organic environment where most ecosystem processes are present, ’ covering the spectrum of habitats from wilderness to human farms and gardens (Beery, 2020). In this particular view, nature is not restricted only to the wilderness without human intervention, but green areas and spaces that offer such ecological functions. With the rapid urbanization and population growth that occupies areas in the urban sector, people living in the cities lose the opportunities to contact with ecosystems and eventually become disconnected from nature (Johnson & Hurley, 2002). In recent years, the voice for humanity to reconnect to nature has grown significantly both from the academy and society aspects (Ives et.al., 2018).

The causes of human-nature disconnections are both from external and internal realities which consist of five factors: (1) material, (2) experiential, (3) cognitive, (4) emotional, and (5) philosophical connections (Figure 1) (Ives et.al., 2018). For instance, people got numbed and overwhelmed by the hype of materialism, which lead to underestimation of nature’s values (Ives et.al., 2018). Moreover, the urban lifestyle created a cognitive disconnection that makes urban residents unfamiliar with nature (Folke et al. 2011). From an experiential aspect, urbanization also had been characterized by multiple studies as the immediate cause of nature disconnection because it reduced green spaces, altered social norms and perceptions, and promoted entertainment (Ives et.al., 2018). The disconnection to nature posed additional stress on biodiversity and

sustainability and might threaten ecosystem services because people care less about the “greens” under cognitive differences. The evidence revealed from the nature-associated willingness to donate resources to conservation (Zaradic, et al, 2009).



**Fig. 1** Conceptualization of different types of humans–nature connections, Adapted from ‘Reconnecting with nature for sustainability’ by Ives et al, 2017, *Sustainability Science* (2018) 13:1389–1397 <https://doi.org/10.1007/s11625-018-0542-9>

## 6.2. Human-nature reconnection

In order to reconnect humanity to nature, the existence of an urban park is important and indispensable. It was found that experiences such as nature play are closely related to the environmental benefits that impact the cognitive connection in adulthood. Nature play experiences, especially in early childhood, are considered a crucial element for individual development in resilience and sustainability concepts (Beery, 2020). Urban parks provide proximity access for nature play, meaning that playing in urban parks have similar outcome as playing in nature environment (Beery, 2020).

Urban Park reconnects humanity to nature through accessibility and engaging experiential qualities (Figure 2). Parks provide a supportive environment for the happiness and challenges that nourish emotions and increase the well-being of children (Beery, 2020). Moreover, people connect with nature experientially and can foster environmental knowledge, concern, and pro-conservation behaviors. For instance, gardens and lawns enhance the school environment, unite communities, and enrich student play and learning experiences (Johnson & Hurley, 2002).

Regarding the quality of experience, urban parks reconnect humanity to nature through spatial qualities, experiential qualities, and temporal qualities (Johnson & Hurley, 2002). For spatial qualities, urban parks contain a variety of physical elements (scale, legibility, complexity, prospect, and refuge) to display an aesthetic landscape to attract visitors (Johnson & Hurley, 2002). Urban parks also provide physical activities and nature experience to foster curiosity and resourcefulness, which mediated immersing of indoor-only play in early childhood (Johnson & Hurley, 2002). Urban parks also are the place of historical record, which the physical and social elements changes in the nearby environment by natural processes over time and provides children endless opportunities for discovery of nature (Johnson & Hurley, 2002). From a cognitive perspective, an urban park is necessary to decouple economic growth from environmental impact by reconnecting people to nature (Beery, 2020). From material and philosophical aspects, the urban park can shift the public perception of materialism away to the sustainability theme (Johnson & Hurley, 2002). Therefore, the urban park is a most feasible key to

reconnect people to nature.

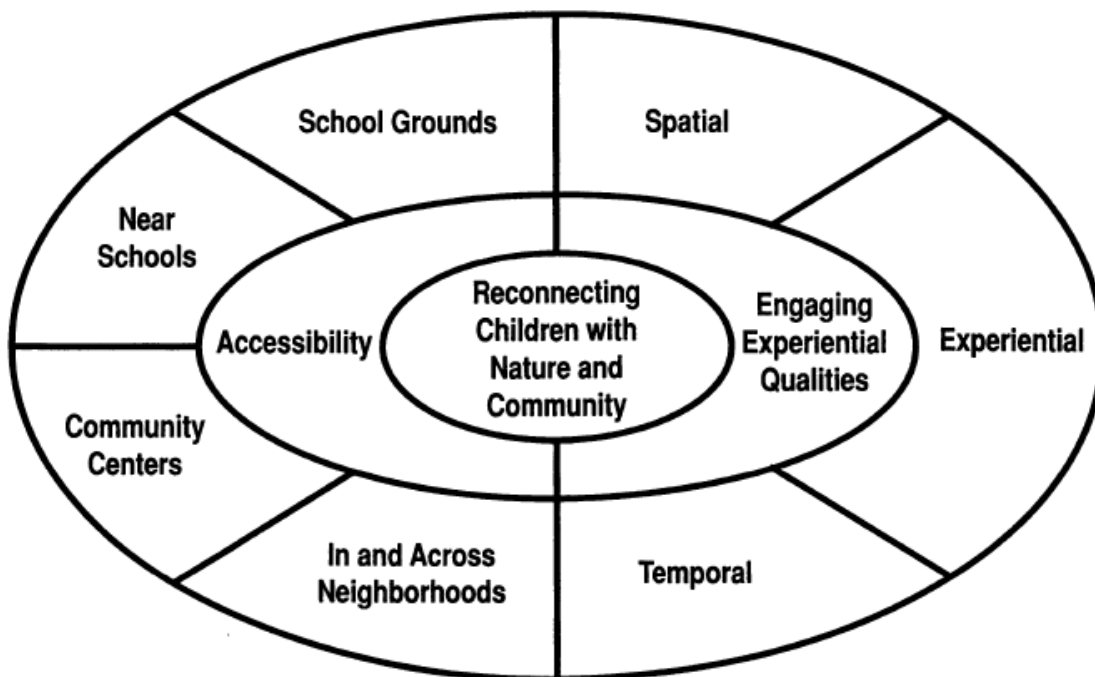


Fig 2: conceptually present factors urban park reconnect humanity to nature and community. Adapted from 'A Future Ecology of Urban Parks: Reconnecting Nature and Community in the Landscape of Children' by Johnson and Hurley, 2002, *Landscape Journal* 21: 1-02 ISSN 0277

### 6.3. Economy

Urban Park also provides enormous economic benefits to the cities. It was found that people with a positive psychological orientation towards nature tend to visit the park more frequently, which in return enhances the human-nature connection (Lin, et al., 2014). People who visit urban parks are likely to spend in-site physical and recreational activities with family, which family units are tending to pay for the services (Silva et al, 2022). In the case study for a large urban park situated near the Castle of Santa Maria da Feira, the average Willingness to Pay for entering tickets was 0.66€ per, 3.13€ for guided activities, and 2.53€ for well-being activities. Moreover, the average wiliness to donate



was 6.73€/year per donor (Silva et al, 2022). Those values indirectly reflect the degree of reconnection by urban parks as monetary terms.

In addition to the tourism benefits, urban parks can stimulate the local economy, as stated earlier by (1) increasing real estate prices, (2) increasing municipal revenues, (3) retaining affluent retirees, (4) and attracting knowledgeable workers and talent (American Planning Association, 2003). Many reports have indicated that property prices near urban parks significantly increase over time. For instance, the Chattanooga government in the 1980s took series of action to lure middle-class residents back, by improved air quality, acquired open space, and creating urban parks (American Planning Association, 2003). As a result, the property values nearby the parks increased by 127.5% after park has been built. When the property value increases, the municipal revenues increase as well (American Planning Association, 2003). In the same case of Chattanooga, the annual tax revenue for the city and county combined increased 99% from 1988 to 1996 (American Planning Association, 2003). According to Statistics Canada, from 2016 to 2021, the number of populations at age 65 and older reaches 7 million, and the older age group accounts for 19% of the population (Statistic Canada, 2022). The affluent group of retirees unlike the young group, they are more mobile and tend to travel, which can bring expendable income into the communities. Moreover, they took less advantage of services than they paid through taxes (American Planning Association, 2003). Thus, urban park retains affluent retirees who brings considerable amount of income into their communities. Urban parks are also considered as vital amenities for good quality of life, which are attractive for knowledgeable workers and talents. According to a survey of 1,200 high technology workers, the attractiveness of a job increased by 33% for good-

quality communities such as places near urban parks (American Planning Association, 2003). Talent workers are normally associated with sedentary jobs, thus places with diverse social and recreational activities are especially attractive and appreciated (American Planning Association, 2003).

#### 6.4. Environmental issues mitigation

Living in an anthropogenic environment in urban areas is surrounded by pollution. Rapid urbanization and improper construction under climate change make urban areas hotter than rural areas, affecting local communities' quality of life and energy consumption. Urban parks as a major blue-green infrastructure in urban ecosystems have tremendous benefits in mitigating the urban-associated environmental issues.

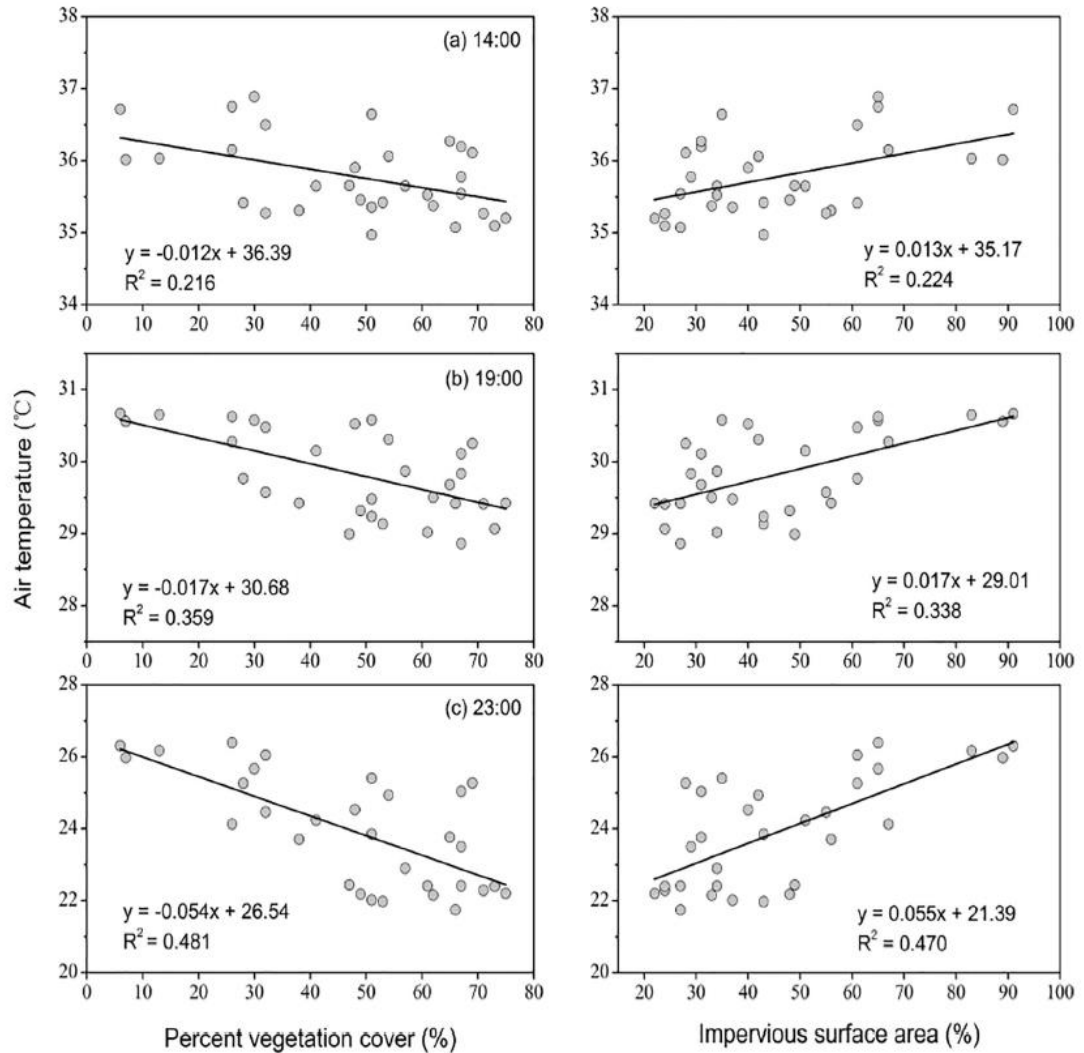
Urban parks can reduce the urban heat islands effectively (Yao et al, 2022). Urban heat islands are characterized by relatively hotter temperatures in urban areas than in their surroundings (Yao et al, 2022). The main reason is the more significant proportion of impervious surfaces in the city with different albedo, which affects the times of reflection and absorption of sunlight (Table 1) (Chithra et al., 2015). The replacement of green areas with asphalt, concrete roads, and other urban infrastructures reduces the urban's albedo (ability to reflect radiation). Places with a high density of buildings, such as downtown areas, can trap the heated air and reduce air movement (Yao et al, 2022). Urban parks, as a solution, contain a fair portion of vegetation that has a great canopy and a high albedo, which can significantly mitigate the outdoor thermal environment (Yan, et al., 2018). Based on a regression analysis between air temperature and land coverage features (Figure 3), the temperature decreases as the vegetation coverage increases at all

times (Yan, et. Al, 2018). With a 10% increase in vegetation coverage, the ambient environmental temperature drops by 0.12 °C and 0.54 °C, respectively, at 14:00 and 23:00 (Yan, et. Al, 2018). Soil as a pervious surface also has a higher albedo than impervious surfaces such as asphalt and concrete, reflecting more radiation back to the sky (Chithra et al., 2015). A study found that the hot and cold regions are highly related to the impervious area and areas with high vegetation or water coverage. The cold spots have a significant confidence level overlapping with urban park areas, implying that urban parks are important for reducing urban heated islands ((Yao, et.al, 2022). Depending on the time difference, urban parks were 0.6 to 2.8 °C cooler than the surrounding urban environment (Yao, et.al, 2022; Yan, et. Al, 2018).

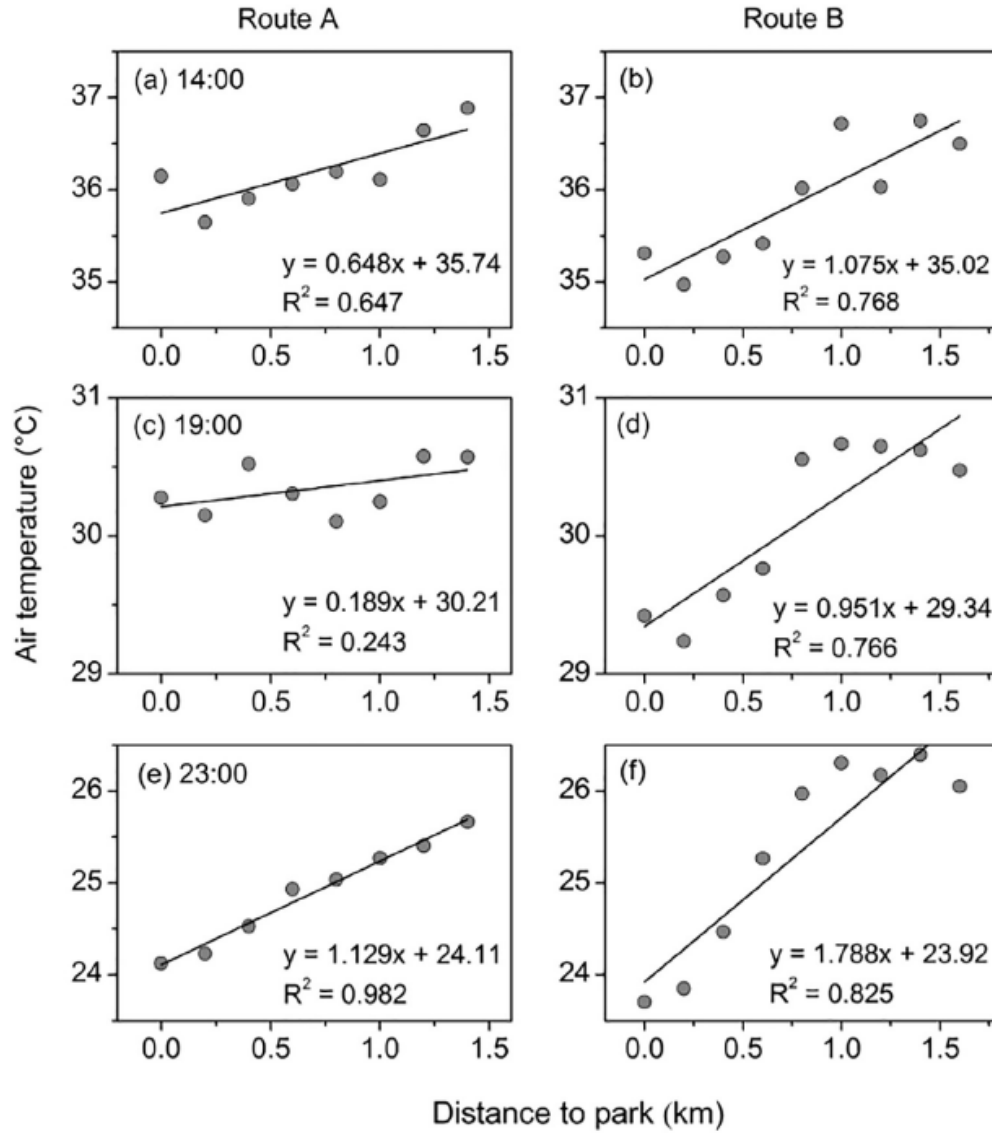
Urban parks can also cool the nearby environment. It was found that air temperature increases as the distance from park boundaries increases, always showing a positive correlation (Figure 4) (Yan, et. Al, 2018). The influence of the cooling effect is affected by the intrinsic factors (such as park area and waterbody portion) and extrinsic factors (such as surrounding and nearby building density) (Yan, et. Al, 2018). It is found that the park area is positively correlated to the park cooling intensity, cooling gradient, and cooling area but negatively correlated to the cooling efficiency (Yan, et. Al, 2018). The density and the height of nearby buildings impact the air movement and the albedo, affecting the cooling effect range (Yan, et. Al, 2018).

**Table 1. The Thermal properties of various surface types. Adapted from “Impacts of Impervious Surfaces on the Environment” by Chithra S.V., Dr. M.V. Harindranathan Nair, Amarnath A, Anjana N.S., 2015, International Journal of Engineering Science Invention, 4(5), 2319-6734.**

Sl.No.	Surface Type	Emissivity	Absorptivity
1	Highly reflective roof	0.85-0.9	0.3-0.4
2	Galvanized roof sheets	0.25-0.28	0.85-0.9
3	Grass	0.97-0.98	0.7-0.75
4	White tile	0.9-0.95	0.1-0.5
5	Tar and Gravel	0.28	0.82-0.97
6	Brick or Stone	0.87	0.6-0.8
7	Asphalt	0.92	0.8-0.95
8	Concrete	0.9	0.65-0.9
9	Dense Canopy trees	0.95-0.99	0.82-0.85
10	Water	0.99	0.95-0.98
11	Black loamy soil	0.66	0.82-0.87



**Fig. 3 Relationships between air temperature and land cover features for the percent vegetation cover and percent impervious surface area at different times. Adapted from “Influence of a large urban park on the local urban thermal environment” by Yan, H., Wu, F., & Dong, L., 2018, Science of the Total Environment 622–623, 882–891**



**Fig.4.** Relationship between distance from the park and air temperature in 3 different measurement times. Adapted from “Influence of a large urban park on the local urban thermal environment” by Yan, H., Wu, F., & Dong, L., 2018, *Science of the Total Environment* 622–623, 882–891

Urban parks also improve surrounding environmental conditions by reducing pollution. Common air pollutants include particulate matter (PM), sulfur dioxide (SO<sub>2</sub>),

ground-level ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>) and carbon monoxide (CO) (Nowak et al, 2014). Canadian studies found a strong correlation between chronic exposure to traffic-related air pollution, particularly NO<sub>2</sub> and an increased risk of ischemic heart disease (Beckerman et al., 2012). Moreover, ambient air pollution is considerably related to respiratory hospitalization, especially for female teenagers. Vegetations such as trees and shrubs can effectively absorb the carbon dioxide from the atmosphere through carbon storage and sequestration and reduce the air pollutants movement by trapping particulate matter in their leaves, needles, and bark (WHO, 2016). In 2010, the total amount of pollution removed by trees was 17.4 million tons in the U.S, which is equivalent to \$6.8 billion in human health value in monetary terms (Nowak et al, 2014). Pollutant removal was subsequently greater in urban areas (\$4.7 billion) compared to rural areas (\$2.2 billion) due to the high-density emission (Nowak et al, 2014). Moreover, the dollar value per tone was greater in places with higher population density, indicating that green spaces such as city parks in the urban area are effective and essential for improving air quality (Nowak et al, 2014).

Noise pollution has detrimental effects on both residents' and species' physical and mental health (Australian Academy of Science, 2020). Birds can hear a narrow range of frequencies, from 1kHz to 4 kHz, but with only one-third sensitivity specific sound frequency as humans (Beason, 2004). Urban parks are natural noise buffer zones within the urban ecosystem that reduces noise pollution. Tree species can reduce the noise value by 20-30dB, depending on the leaf density and canopy width (Tekeykhah et al., 2019). Studies have shown that the noise screening by vegetation is usually low unless the planting is dense and deep enough. A 5 m depth of vegetation barrier was most effective

in reducing traffic noise, which urban parks way exceed the minimal requirement (Ow and Gholsh, 2017). On average, noise buffer zones by vegetation can offer 9–11 dB noise reduction (Ow and Gholsh, 2017). Therefore, urban parks provide relatively quiet areas for the relaxation of park visitors and habitats for bird species

Urban parks are also essential for managing stormwater in urban areas as most vegetation surfaces have been converted into impervious building surfaces (Zhang et al, 2012). A case study in Beijing found out that green space near the impervious area such as roadsides has the highest runoff coefficient, whereas residential green space has the lowest (Zhang et al, 2012). It indicates that the runoff reduction relates to areas of the pervious area surrounded by impervious areas. Urban parks, as a critical green element in urban ecosystems, have a large pervious surface to store and delay runoff. Beijing has a total green space of 61,695 ha that can reduce about 154 million cubic meters of rainwater runoff, meaning each hectare can reduce 2494 cubic meters of runoff (Zhang et al, 2012). If the human-made facility entirely replaced the rainwater runoff reduction by the urban green spaces in the 2009 background, an additional cost of 1.34 billion RMB must be paid when 1 RMB = 6.83 U. S (Zhang et al, 2012). The cost of runoff reduction function by itself is equivalent to three-quarters of the maintenance cost of Beijing's all green space (Zhang et al, 2012). Thus, the ecosystem services of urban parks in monetary terms show great economic benefits for locals to manage the environment (Zhang et al, 2012)

### 6.5. Holistic health

Urban Park is not only the bridge between humanity and nature but also the natural-based solution to improve holistic health. The combined effect of severe environmental conditions and busy lifestyles in urban areas poses adverse impacts and pressure on the residents' health. The rapid population growth and uneven distribution of limited natural resources create extra stress for urban to provide a healthy environment to support human health. Parks are the most accessible natural spaces for people in urban environments, and the high density of vegetation and opportunities of urban parks improves visitors' holistic and mental health. Urban Park improves the holistic health of visitors by increasing social capital, reducing risks of diseases, and improving immune systems.

Physical and leisure activities involve interactions and cooperation between participants, which increases the social cohesion at the community scale. It has been found that there is a strong correlation between physical activities and green space (WHO, 2016). As green space increases, the outdoor playtime for children and the frequency of physical activities both increase (Grigsby-Toussaint, et.al, 2011) & (Sugiyama, et.al, 2013). Moreover, outdoor play time couples with environment perception have benefits for improving life satisfaction (Chu & Chang, 2021). The presence of green space in the urban area reduces the feelings of loneliness and social insecurity (WHO, 2016). Urban parks provide a relaxing green environment for all ethnic groups to chill and enjoy the outdoor life, increasing social capital (Peters, et.al, 2010). The 'encounter' function in the activities increases the visitor stickiness by allowing people to communicate and share the experience with different individuals, strengthening the reconnection between humans and nature (Peters, et.al, 2010).

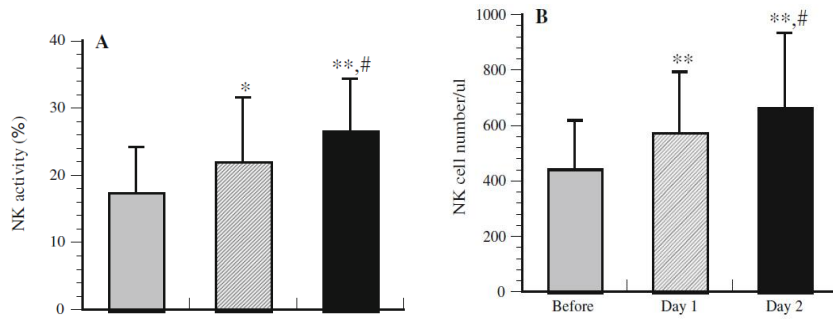


When people actively engage in physical and leisure activities in urban parks, their physiological health condition increases correspondently over time. It was found that overweight and obesity strongly correlate with cardiovascular disease. Moreover, obesity can impact or accelerate all types of mortality, including but not limited to several types of cancer. During pregnancy, obesity is associated with the risk of excessive birth weight. Green exercise, such as running in a park, has been proven more beneficial than other types of exercise in other urban places because green spaces have better environmental conditions (such as air quality, pollution level, and noise level) (Marselle et al., 2013). A study found that teenagers live within 500m from their homes to parks and had a smaller percentage of obese or overweight (Wolch, et.al, 2011). In contrast, areas with lower greenness exhibit higher levels of stroke mortality and cardiovascular disease mortality. Therefore, urban parks indirectly reduce the obesity rate of visitors by holding a variety of leisure and physical activities.

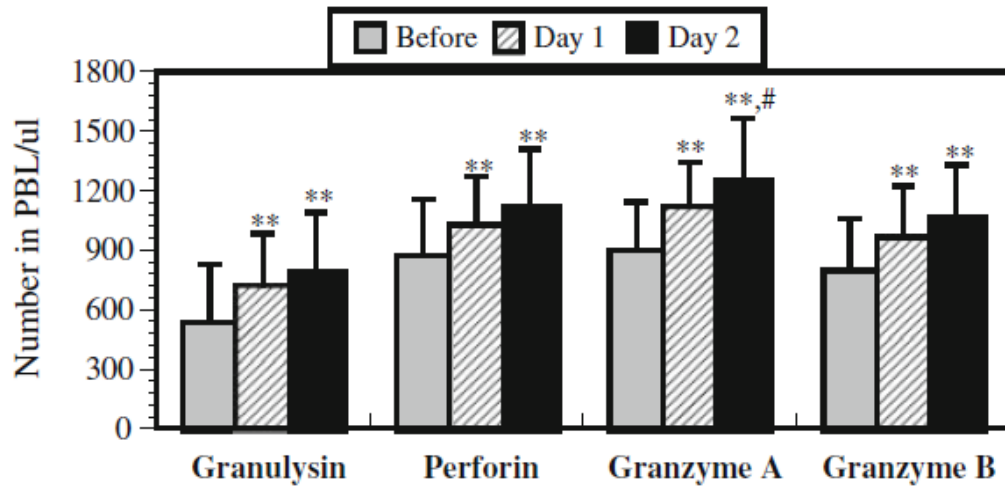
Playing in the urban park that exposure to greenness also improves visitors' immune system functions. Tree species release phytoncides (essential oils) to increase Natural Killer activities, which can significantly enhance the cytolytic activity of NK-92MI cells, as well as increase the level of perforin, GrA, and GRN in NK-92MI cells (Li, 2010). When human natural activity or level of perforin, GrA, and GRN in NK-92MI cells drops, phytoncides also help to restore the decreases. For instance, the essential oil from *Zanthoxylum rhoifolium Lam* leaves, and some terpenes show anti-tumour and immunomodulatory ability *in vivo* and *in vitro* in mice experiments (Silva, et.al, 2007). The essential oil from *Pinus mugo* exhibited antioxidative properties (Grassmann et.al, 2003). Moreover, it has been demonstrated that children are in contact with the natural

environment during their first-year exposure to specific allergens and bacteria, unlike to have recurrent wheeze and allergic sensitization in the future (Lynch et al., 2014). Thus, green space with great tree coverage benefits the human immune system.

A Japanese researcher has conducted a series of studies demonstrating the associations between visiting forests and immune system responses (Li, 2010). A study conducted an experiment of 3 days 2-night forest bathing trip to monitor the changes in anticancer proteins (natural killer activity, the numbers of NK, granulysin-, perforin-, and granzymes A/B-expressing lymphocytes) (Li, 2010). Natural killer cells are essential for the immune system, which kills tumor or virus-infected cell, by releasing perforin, granzymes, and GRN through the granule exocytosis pathway (Li, 2010). The result shows that natural killer activity and the number of natural killer cells were significantly higher when exposed to greenness (Figure 5) (Li, 2010). The numbers of intracellular perforin-, GRN-, and GrA/B-expressing lymphocytes were also much higher (Figure 6) (Li, 2010). Regarding the duration of immune system improvement, the boosting of natural killer activity and the more significant number of GRN, Perforin, GrA, and GrB can last up to one month, followed by a forest bathing trip (Figure 7&8). In contrast, visiting places other than green spaces show no impact on NK activity, which implies that urban parks are essential for a city to improve public health. Thus, exposure to greenness can improve the immune system as the NK activity increases, which is partially mediated by increasing the number of NK cells and intracellular anticancer proteins (Li, 2010).



**Fig 5. The Effect of a forest bathing trip on natural killer (NK) activity (a) and the number of NK cells (b).** Adapted from ‘Effect of forest bathing trips on human immune function’ by Li,Q. (2010). Environ Health Prev Med, 15:9–17 DOI 10.1007/s12199-008-0068-3



**Fig.6. Effect of forest bathing on granulysin- (GRN), perforin-, and granzymes (Gr) A/B-expressing cells in PBLs before and after the trip.** Adapted from ‘Effect of forest bathing trips on human immune function’ by Li,Q. (2010). Environ Health Prev Med, 15:9–17 DOI 10.1007/s12199-008-0068-3

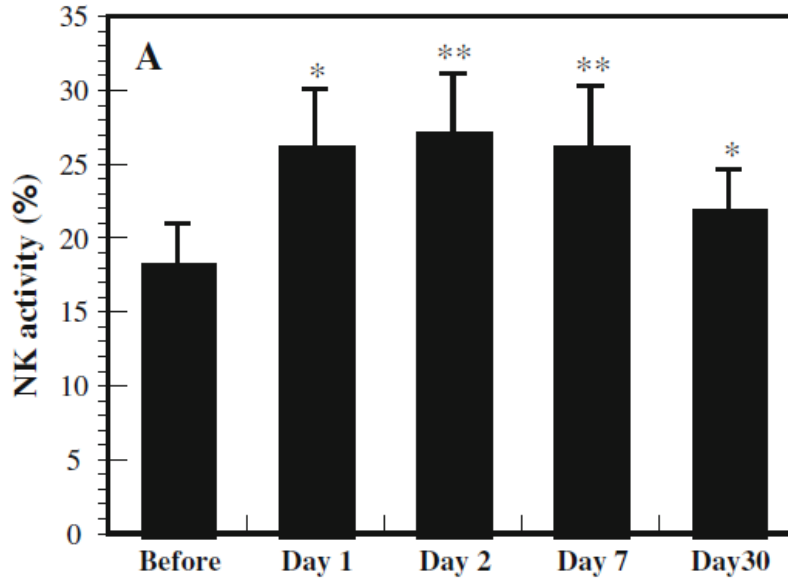


Fig 7. Effect of forest bathing on natural killer activity over 30 days. Adapted from ‘Effect of forest bathing trips on human immune function’ by Li,Q. (2010). Environ Health Prev Med, 15:9–17 DOI 10.1007/s12199-008-0068-3

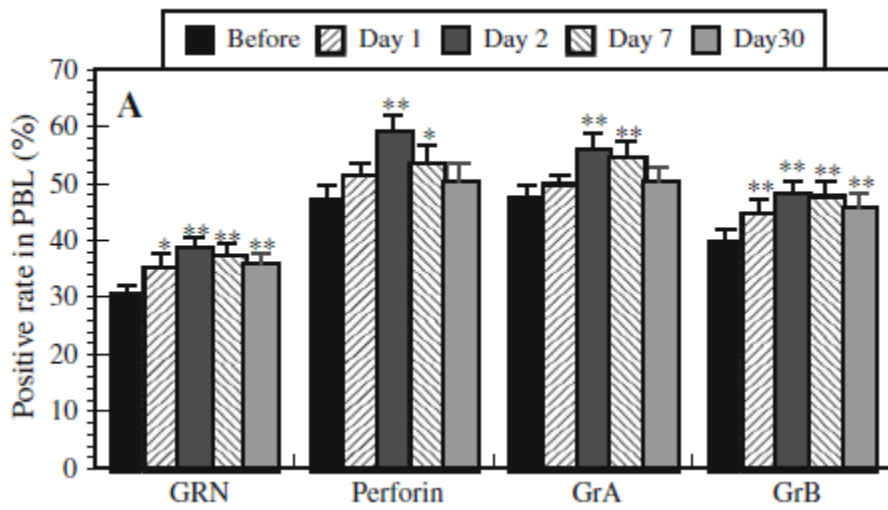


Fig 8. Effect of forest bathing on granulysin- (GRN), perforin-, and granzymes (Gr) A/B-expressing cells in PBLs over 30 days. Adapted from 'Effect of forest bathing trips on human immune function' by Li,Q. (2010). *Environ Health Prev Med*, 15:9–17 DOI 10.1007/s12199-008-0068-3

## 6.6. Mental Health

In addition to improving the public well-being in the physiological term, the urban park also improves psychological health by reconnecting people to nature, which can be explained by Psycho-physiological stress reduction theory and Attention Restoration Theory. The Psycho-physiological stress reduction theory suggests that reconnection to nature can shift the stress to a more positive emotional state (WHO, 2016). People visit a nature environment overwhelmed with non-threatening natural stimuli, which triggers a parasympathetic nervous system response leading to feelings of relaxation and enhanced well-being (WHO, 2016). Attention Restoration Theory pointed out that people have two types of attention-directed attention that require effort and effortless involuntary attention (WHO, 2016). Directly attention is limited and is consumed during daily work and demanding tasks, which can be restored in a natural environment from its interesting and rich stimuli in natural settings (WHO, 2016). Given that urban parks can mimic the natural environment with similar benefits such as forest bathing and outdoor nature play, visiting urban parks can achieve similar results in improving mental health.

Many studies have demonstrated the evidence of mental health benefits from reconnecting humanity to nature. Compared to the city environment, the psychoneuroendocrine responses of visitors to the natural environment show lower concentrations of cortisol, lower pulse rate, lower blood pressure, lower sympathetic

nerve activity, and greater parasympathetic nerve activity (WHO, 2016). Moreover, the accessibility and proximity from homes of pregnant women to green spaces are positively correlated with birth weight, which is a helpful indicator of the mental health of the mother (Dzhambov et al., 2014) & (James et.al., 2015). According to a Profile of Mood States (POMS) test, a short and leisure visit to the forest significantly increases vigour and decreases anxiety, depression, and anger. Sturm and Cohen found out that residents who live within 400m from the nearest parks have 4-5 times more visiting times than those who live 1.6 km away. People who live closer to urban parks exhibit a higher MHI-5 score, which is a mental health index from the Medical Outcomes Study (Sturm &Cohen, 2014). Based on a recent longitudinal study on approximately 575,000 adults in Canada, the mortality rate reduction is associated with an increase in residential green spaces (Villeneuve et al., 2012). Another study on subjective well-being obtains a similar result, in which visitors feel significant improvement in life satisfaction and greater subjective well-being after urban park visits (Yuen &Jenkins, 2020). Most importantly, this mental improvement cannot be mediated or replaced by physical activities (Triguero-Mas et al., 2015). Therefore, urban parks play an important role in improving both physiological and psychological health with greater well-being in the urban context.

## 7. Therapeutic landscape case in Stanley Park design

Stanley Park is one of the iconic urban forest parks in Canada, the design of the park showcases a successful project for attracting visitors and improving their well-being. The key design of the therapeutic plant landscape in Stanley Park tackles the five senses of humans (sight, smell, taste, hearing, and touch) because the sense organs (eyes, nose,

tongue, ears, and skin) interact with the brain to help people perceive and interpret the external environment (He et al., 2022). In implementing the design, the Park contains high biodiversity and landscape structural richness within its natural old-growth forests to enhance sensory experiences. Regarding the colour theme, the main tone of the park is green, which is believed to be the 'recovery' color for nerve regulation and rest. On the other hand, the artificial elements are usually in a light colour for enrichment and decoration, making natural green stand out to provide a wonderful visual experience. Regarding the sense of hearing, Stanley Park designs the plant landscape in a way to attract birds and insects that produce natural sound to enhance the dynamic visual effect and enriches the auditory interaction. Regarding the sense of touch, Stanley Park contains an artificial garden (Rock Garden) with a high density and diversity of plants with different textures, allowing the visitor to feel a variety of tactile stimulations, which brings visitors closer to nature. Regarding smell, Stanley Parks contains Western hemlocks, Western red cedar, and Douglas fir, which contain rich phytoncides to provide a strong pleasant odor smell. Regarding tastes, fruit trees and berry shrubs are also planted in Stanley Park to provide visitor's an interactive experience (He et al., 2022). Combining those elements, Stanley Park provides a highly functional landscape that improves visitors' well-being by stimulating their five senses.

## 8. Conclusion/Summary

As urbanization converted more natural areas into the urban sector, society gradually became disconnected from nature. The disconnection from nature involved five components (1) material, (2) experiential, (3) cognitive, (4) emotional, and (5)

philosophical connections, which in combined affect materialism, cognitive difference, and social norms changes. Urban parks, as one of the most significant urban green spaces, are the key to reconnecting humanity to nature. Urban parks have been found to provide visitors with a similar experience as a natural environment, such as outdoor nature play. With good access and quality of experience, urban parks can develop urban sustainability and resilience in young children, enhancing the connection and increasing their familiarity with nature. By reconnecting people to nature, the urban park improves the well-being of people. Regarding the economy, urban parks increase tourism and nearby property prices, attract people, retain affluent retirees, and attract human talent. The ecological services of the urban park also mitigate environmental issues in urban areas, including the reduction of urban heat effects, the reduction of air pollution, the reduction of noise pollution, and stormwater management. Most importantly, an urban park improves the holistic health of visitors by increasing social capital, reducing risks of diseases, and improving immune systems. Following an urban park visit, people also feel an improvement in life satisfaction and mental health. Many places have adapted and introduced the therapeutic plant landscape to improve the public's well-being. In the case of Stanley Park, the design focuses on the five senses of humans, in which the landscape is organized to enrich the visitor's experience and bring the visitor close to the natural environment.

## 9. Recommendation

Given that urban parks play an important role in reconnecting people to nature in urban areas with various benefits, the design of the parks is decisive to the effectiveness



of improving public well-being. Regarding the benefits of mitigating climate change effect in the city, an urban park with an area of 1.08 ha is found to have the highest efficiency in reducing the urban heat island effect (Yao et al, 2022). Moreover, the therapeutic landscape design should focus on the five senses of humans (sight, smell, taste, hearing, and touch) to provide excellent experiential qualities. According to a life satisfaction analysis after visiting the urban park, 64% of visitors feel improvement in subjective well-being when the staying time reaches 20.5 mins, which suggests that the design of trail and routes of a park should contain an estimated 20 minutes of walking (Yuen & Jenkins, 2020).

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**Communication features:**

# URBAN PARKS AND HOLISTIC WELL-BEING FOR RECONNECTING PEOPLE TO NATURE

## ISSUES OF URBANIZATION ON HUMAN DISCONNECTON WITH NATURE



- Materialism and Over-consumption
- Social Norm Changes
- Cognitive Differences
- Spatial Separation

## HOW CAN URBAN PARKS HELP




### RECONNECT BY:

- Proximity access for nature play
- Nature-like environment
- Activities for Environmental Knowledge and Pro-conservation behaviour
- Sensible Natural Succession

### ENVIRONMENT

- Pollution Mitigation
- Heat Reduction
- Stormwater Management
- Noise Reduction



### ECONOMY

- Eco-Services in Monetary terms
- Tourism
- Stimulate Economy (eg. real estate value, municipal revenues)

### HOLISTIC WELL-BEING

- Increasing Social Cohesion
- Reducing Risks of Diseases by In-park Activities
- Improving the Immune System - Tree-released Oils
- Improving Mental Health



### RECOMMENDATION

- Ideal 1.08 ha size in design for highest efficiency to reduce urban heat island effect
- Around 20.5 mins. for each visit to gain the greatest mental improvement

